

Geospatial data in the Pacific

An example of the atoll Nation Tuvalu



Pacific
Community
Communauté
du Pacifique

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GEM

Geoscience, Energy and Maritime Division

Basic geospatial data in the Pacific are often lacking

Tuvalu: country data and statistics (worlddata.info)



Tuvalu Geography Profile

Elevation extremes **highest point:** unnamed location 5 m
lowest point: Pacific Ocean 0 m
mean elevation: 2 m

Tuvalu is an archipelago in the Pacific about 3700 km away from the Australian mainland. The dwarf state has a total area of only 26 km² (10 mi²) and a total coastline of 24 km (14.9 mi). This land area is about 0.8 times the size of Manhattan. In terms of area, Tuvalu is thus the third smallest country in Oceania after [Tokelau](#) and Tuvalu and the eighth smallest country worldwide. With 454 inhabitants per km², it is also one of the [most densely populated countries](#).

The highest elevation (Funafuti) reaches only 5 meters. The archipelago consists of 9 [islands](#). Tuvalu has no direct neighbours. The distance between New York City and the Capital Funafuti is about 12,060 km (7,494 mi).

How can we support sound risk informed adaptation solutions and develop long-term strategies without the most basic information about the islands?



Tuvalu

CURRENT FORECAST: TUVALU AND A CHANGING CLIMATE

Rising sea levels and creeping tides routinely engulf the remote Pacific island group, degrading its shoreline, eroding its natural ecosystems and threatening the nation's very existence.

• **The country, in brief.** Home to some 11,000 inhabitants, Tuvalu consists of three islands and six low-lying atolls scattered across the middle of the Pacific Ocean. The nation's highest points reach 4.5 metres (14.8 feet) above sea level. Tuvalu's outer islands are largely isolated, hindering communication and making it difficult to provide essential supplies in the face of or following weather-related destruction.

Sea Level Rise in Tuvalu

Show affiliations

Lin, C. C. ; Ho, C. R. ; [Cheng, Y. H.](#)

Most people, especially for Pacific Islanders, are aware of the sea level change which may caused by many factors, but no of them has deeper sensation of flooding than Tuvaluan. Tuvalu, a coral country, consists of nine low-lying islands in the central Pacific between the latitudes of 5 and 10 degrees south, has the average elevation of 2 meters (South Pacific Sea Level and Climate Monitoring Project, SPSLCMP report, 2006) up to sea level. Meanwhile, the maximum sea level recorded was 3.44m on

Sea Level Rise: Some Implications for Tuvalu

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The entire atoll chain extends over 700 km of ocean, but the total national land area is only 24 km². The largest single island is 5 km²; the highest point of all islands is 4.5 m above mean sea level and most land areas are appreciably lower. Survey data are not available for islands

Symbol Hunt

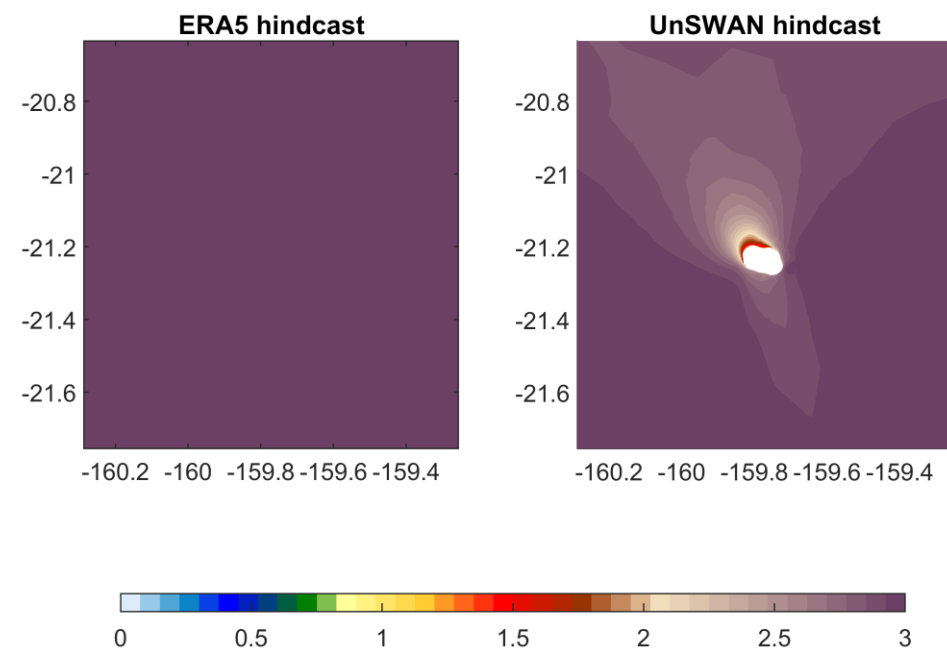
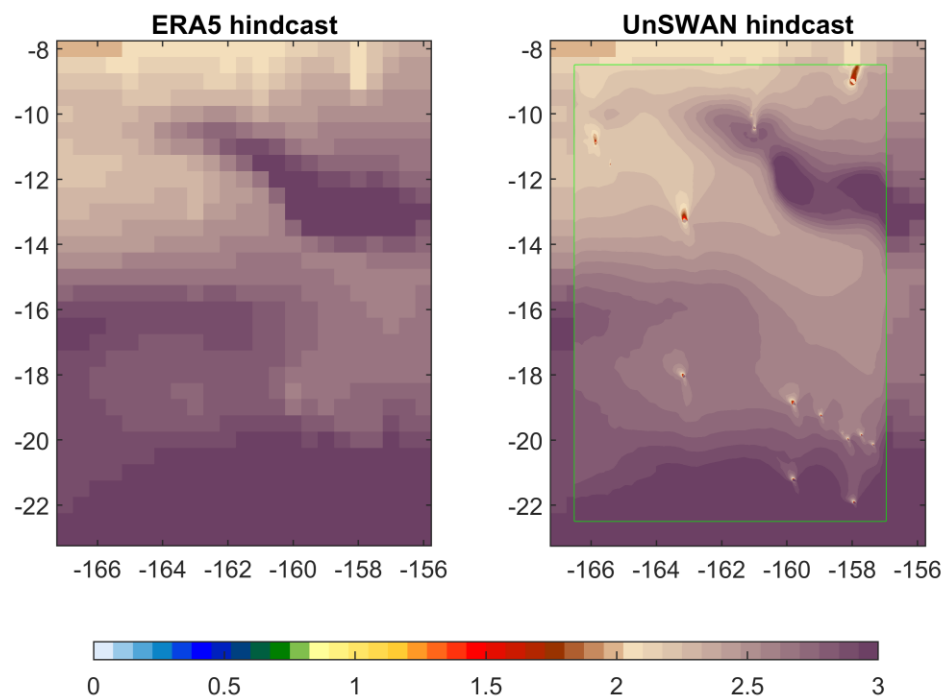
NATIONAL SYMBOLS → COMPARE 𠂆 SEARCH Q COUNTRIES

Home » [Australia/Oceania](#) » [Tuvalu](#) » Average Elevation

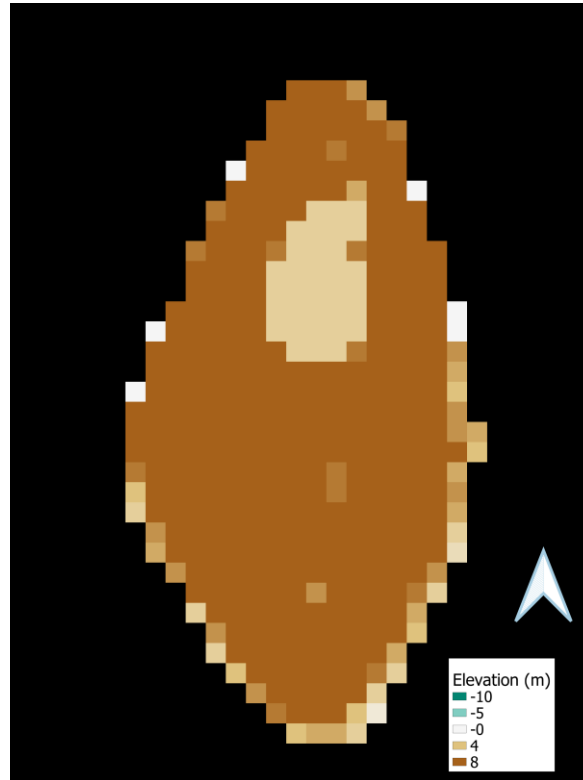
AVERAGE ELEVATION ABOVE SEA LEVEL OF TUVALU IS 4.6 M

King Tide was defined and discussed by Lin et al. (2014) as the average island elevation.

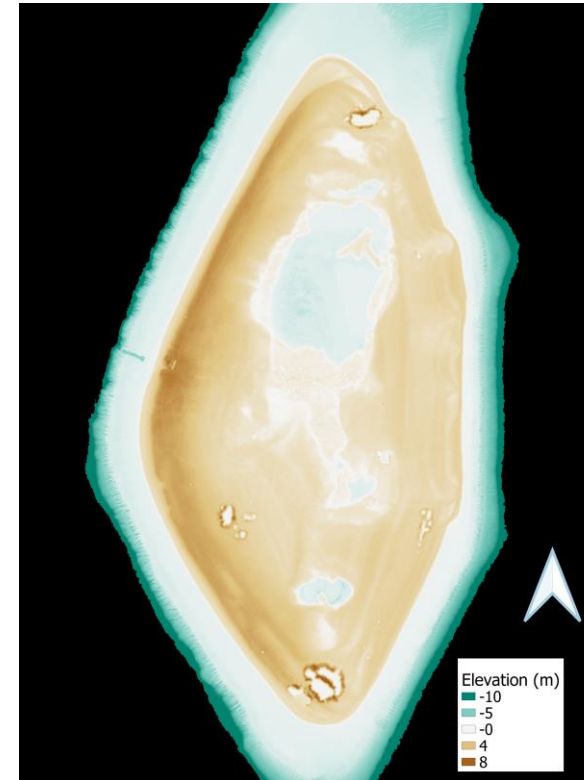
Global products fail to capture small islands



Global products fail to capture small islands



Global topography dataset (SRTM)

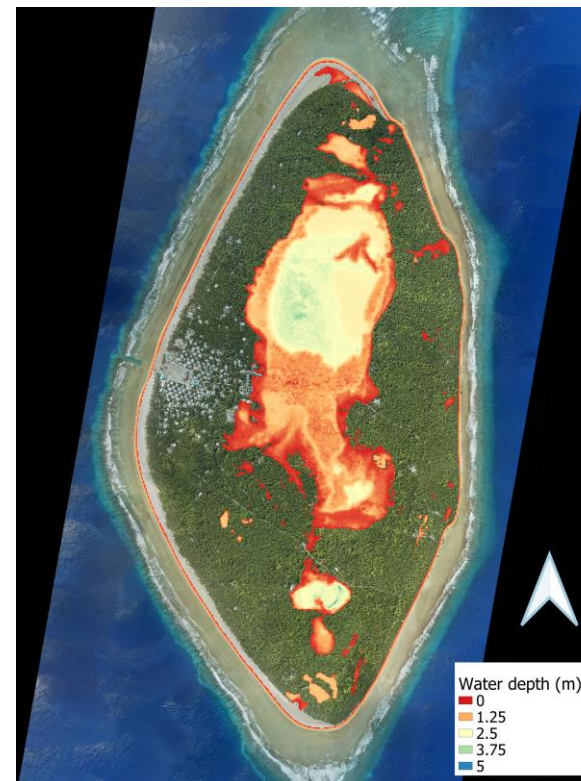


High-resolution LIDAR data

Global products fail to capture small islands



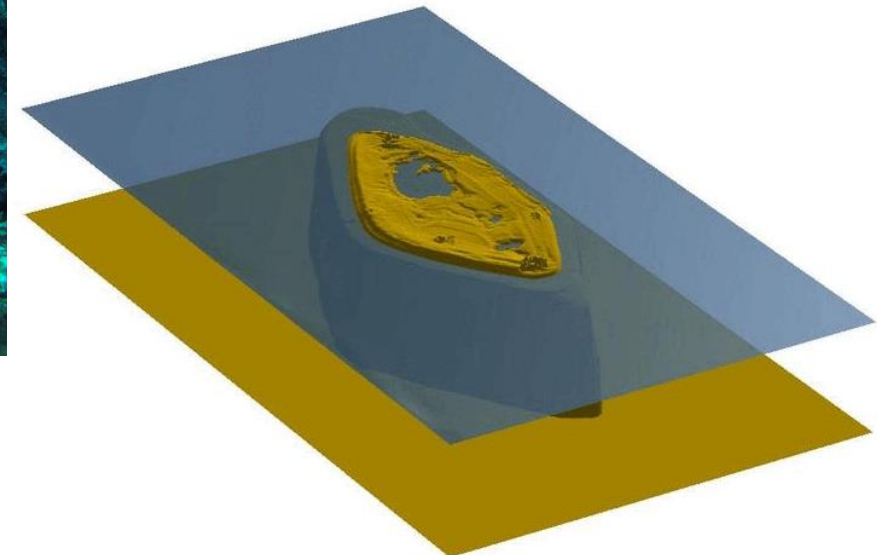
Global topography dataset (SRTM)



High-resolution LIDAR data

SPC's Ocean Monitoring & Prediction Team

- Collection of baseline data
- Coastal monitoring and in-situ data collection
- Numerical and statistical modelling
- Development of decision-making tools




Strengthened Risk Knowledge

<https://opm.gem.spc.int/tcap/home>

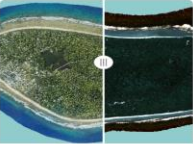
TCAP Dashboard

This dashboard was developed under the Tuvalu Coastal Adaption Project (TCAP). The portal provides home for gridded and geospatial data produced by the project.




Inundation
Shows inundation for different climate projections.

[Browse >](#)




Shoreline Change
Tool to analyze shoreline change overtime.

[Browse >](#)



Risks
Shows risk level on different assets.






[Browse >](#)



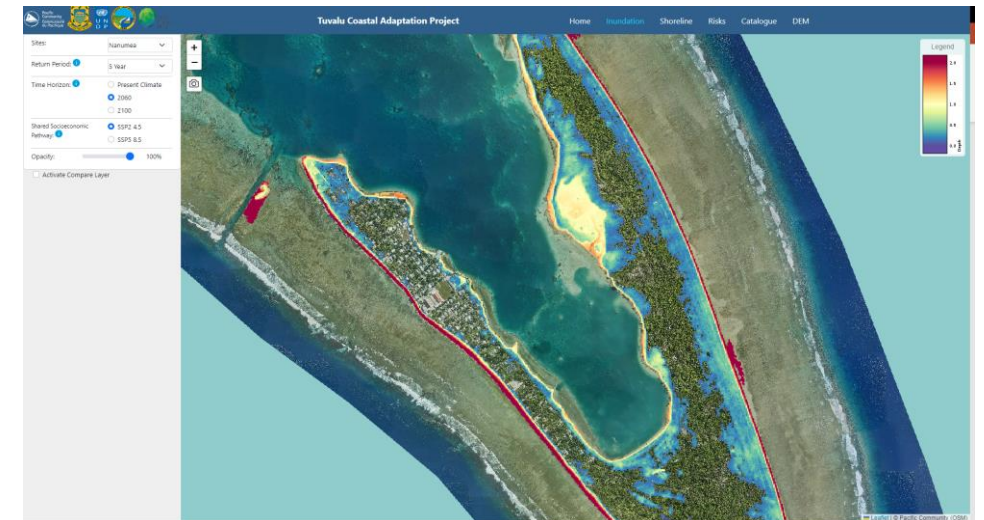
Catalogue
A collection of reports produced.

[Browse >](#)

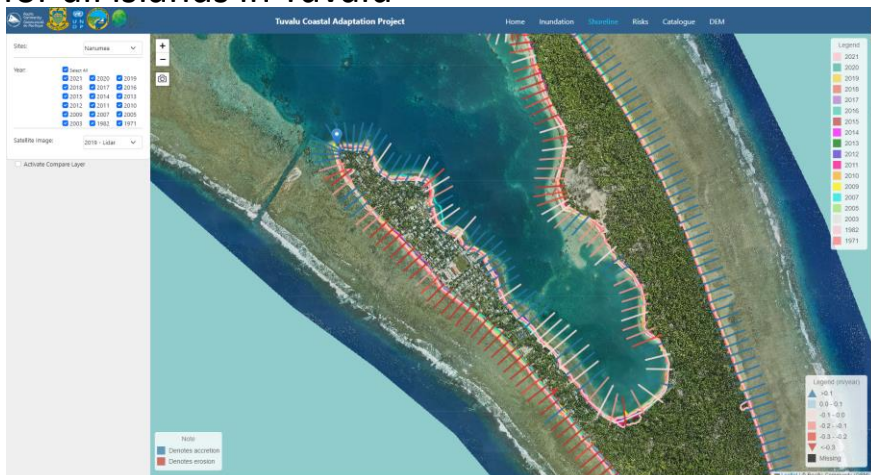
Developed and Funded by:

Coastal inundation hazard & risk products for present and future scenarios

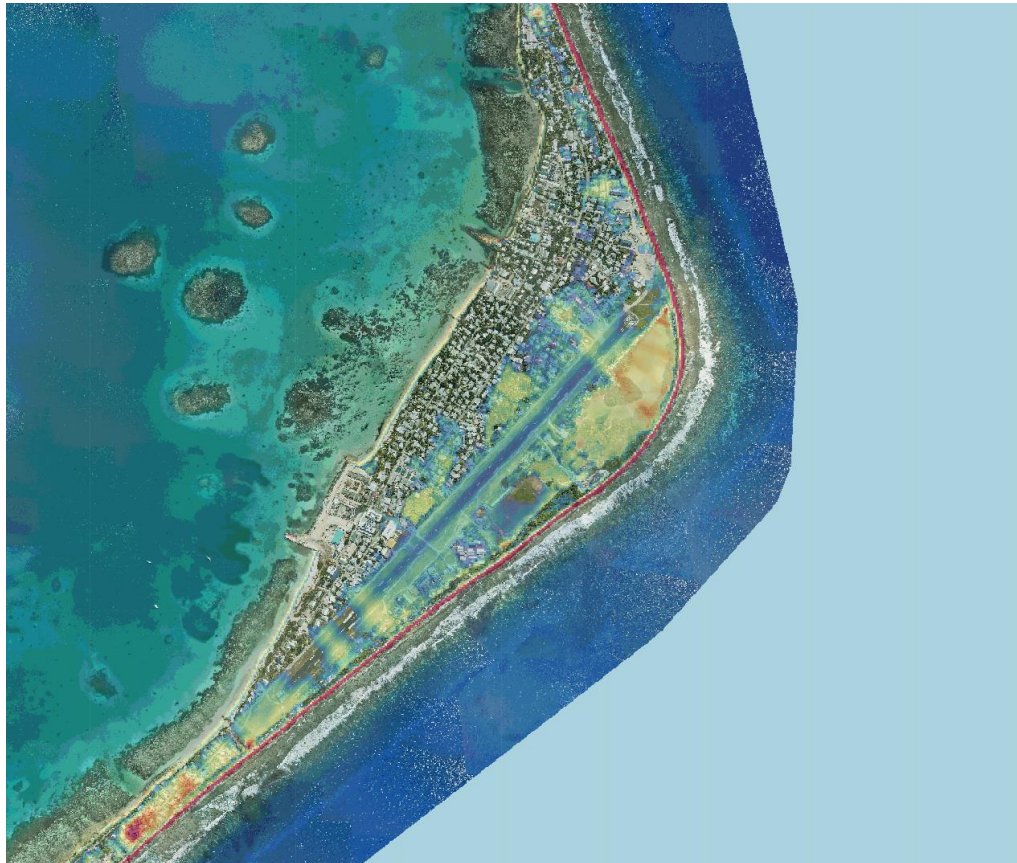


Interactive access to half a century of shoreline change for all islands in Tuvalu

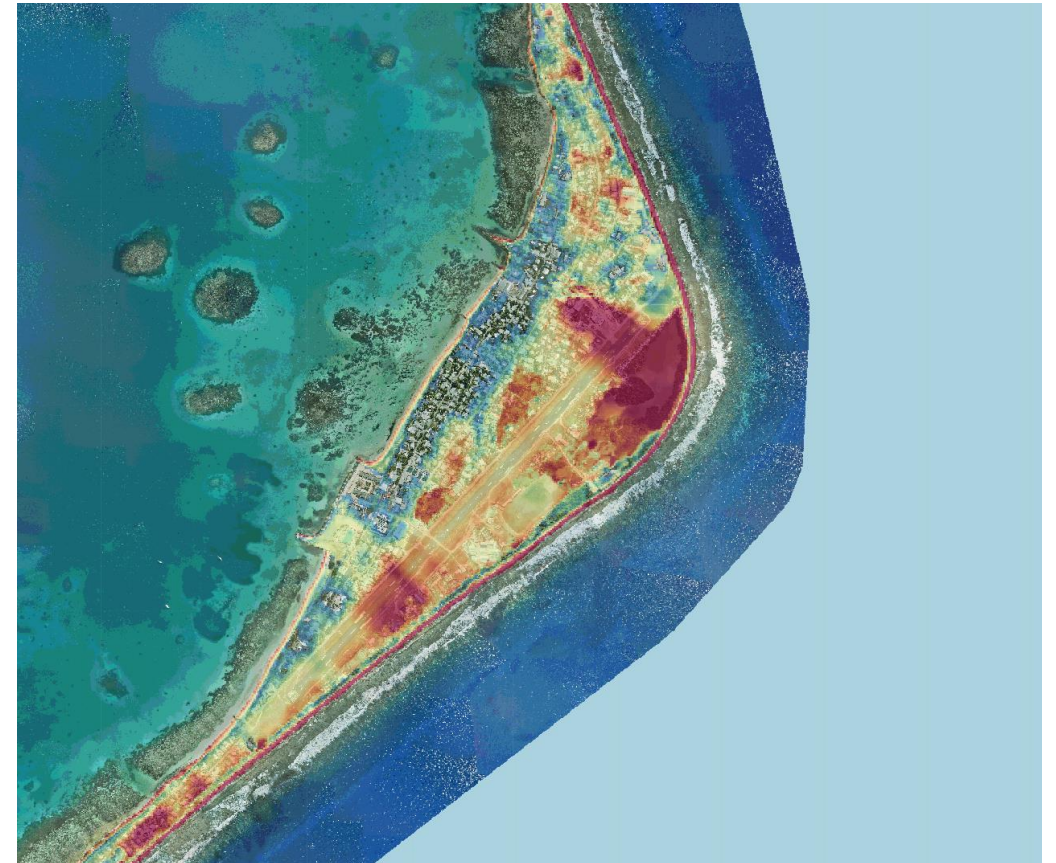


Strengthened Risk Knowledge

<https://opm.gem.spc.int/tcap/home>



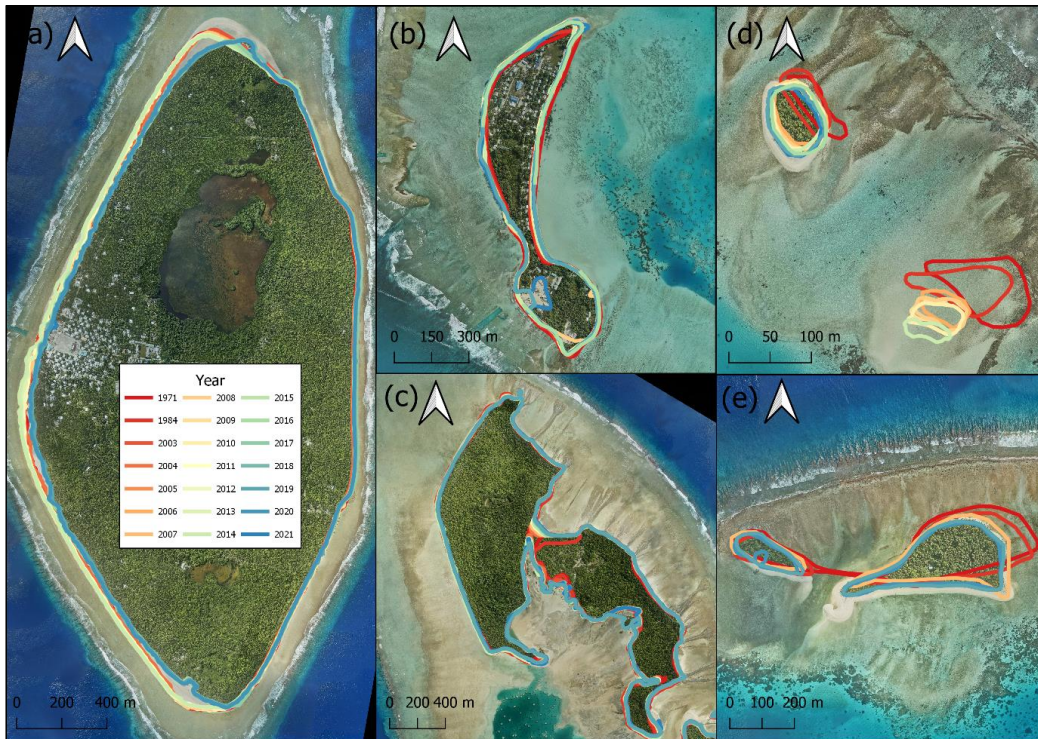
1-in-10-year flood event with present sea levels



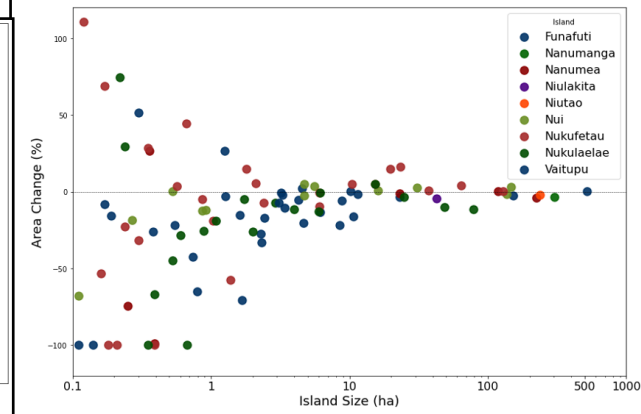
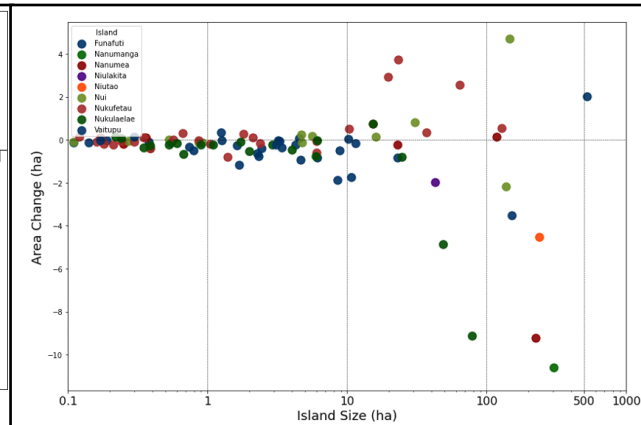
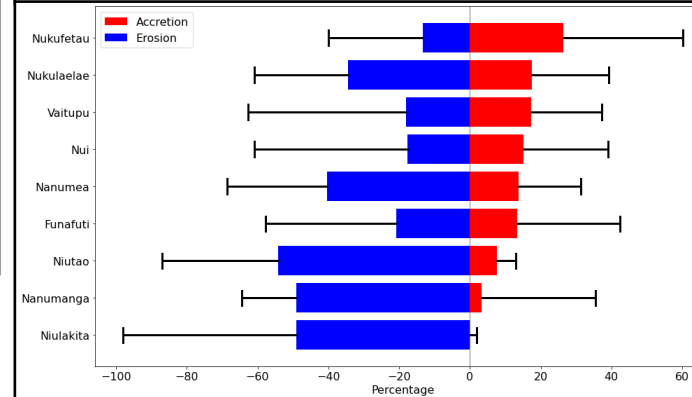
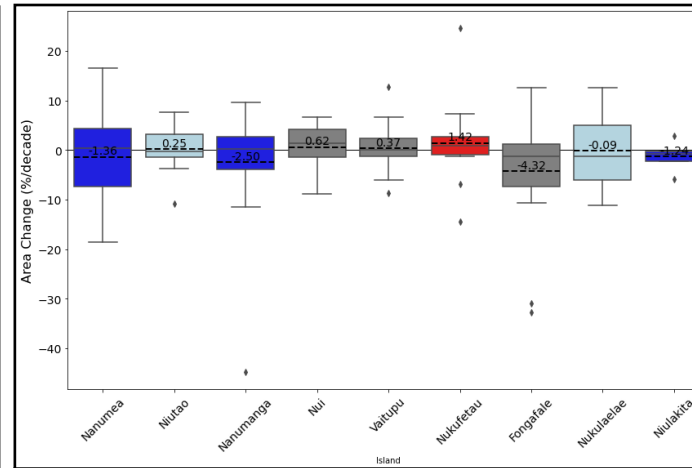
1-in-10-year flood event with 73 cm of sea level rise (SSP2 4.5 2100 projection)

Strengthened Risk Knowledge

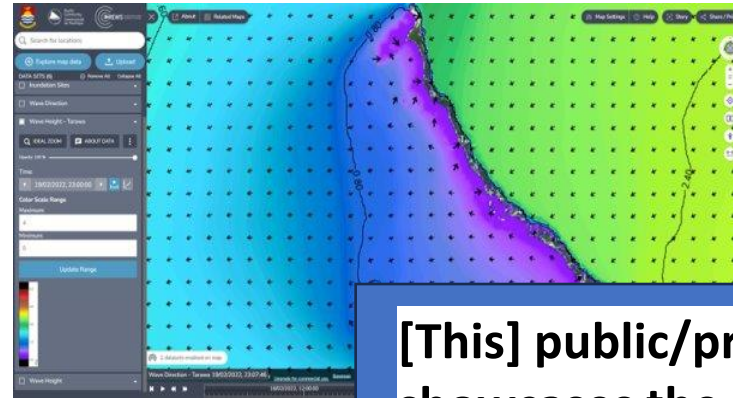
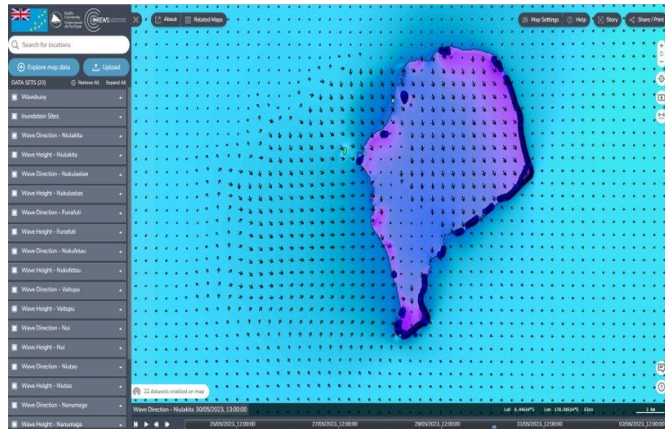
<https://opm.gem.spc.int/tcap/home>



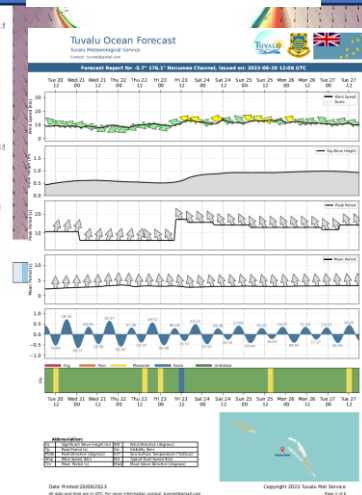
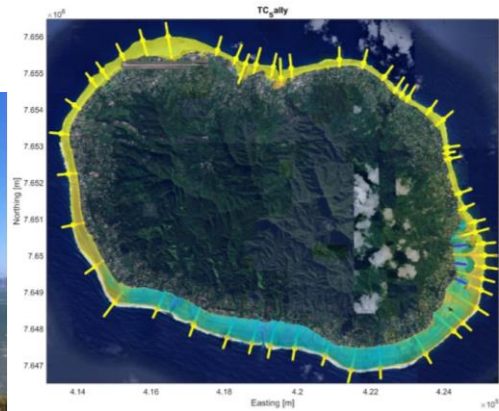
- National-scale shoreline change analysis spanning five decades (1971 – 2021)
- Three proxies used and compared to determine shoreline position
- Training programme currently underway to allow GoT to undertake shoreline monitoring programme



Strengthened Ocean & Warning Services



[This] public/private partnership ... showcases the emerging opportunities from investment and training in strengthened ocean services at the Met Service."



Strengthened Resilience through risk informed decision



Inform minimum floor levels in Tuvalu's National Building Code (TNBC)



<https://tcap.tv/>

New ocean risk knowledge informed more than \$50M of investment in climate change adaptation solutions.

<https://www.adb.org/projects/49450-042/main>

New ocean risk knowledge informed ~\$10M of investment in renewable energy solutions.

Shoreline change

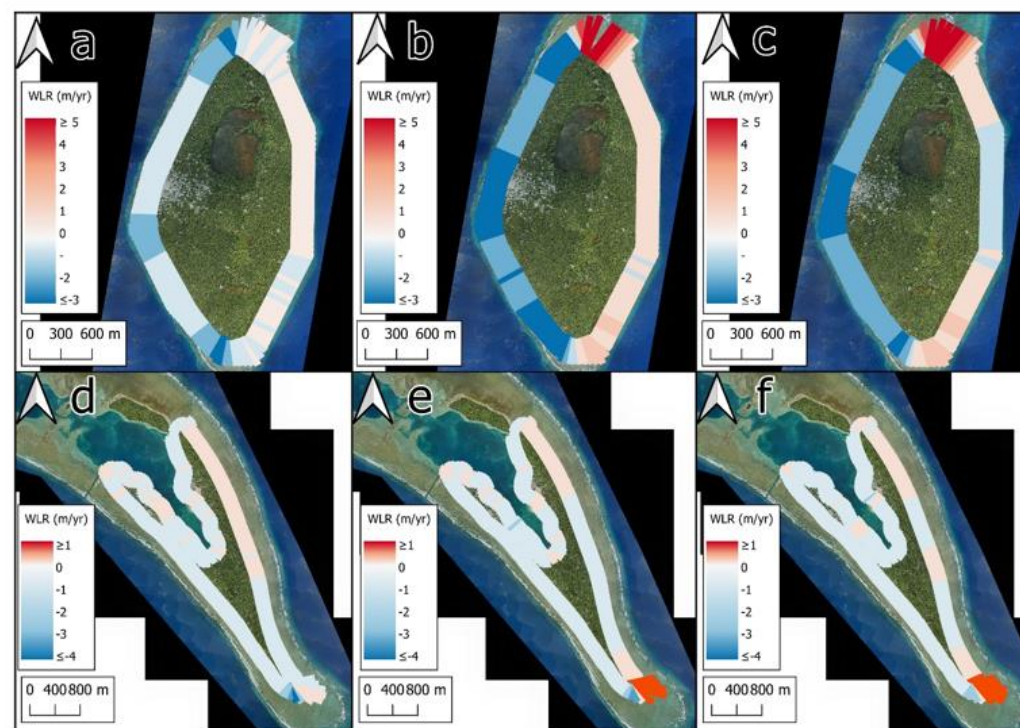


Figure 2 Comparison of three shoreline proxies of vegetation line (a and d), toe of beach (b and e) and Watermark (c and f). Shoreline proxies for Nanumanga (a,b,c) show similar areas of erosion and accretion, it